

# Retrieving Balloon Data in Flight

Completed Technology Project (2012 - 2012)



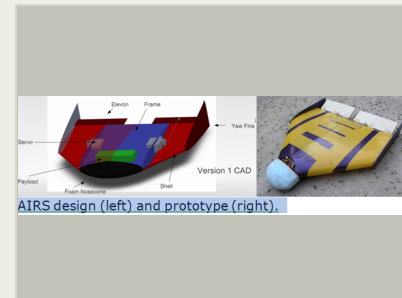
## Project Introduction

NASA's Ultra Long Duration Balloon (ULDB) program will soon make flights lasting up to 100 days. Some flights may generate high data rates and retrieving this data in flight may be prohibitively expensive using existing techniques. In a one-day workshop we will explore options for cheaply and safely retrieving balloon data in flight. We will explore satellites, ground stations, and an autonomous GPS-enabled glider we are developing.

NASA has plans to fly stratospheric ULDBs for missions of 100 days or more in the next few years. As these balloons circumnavigate the globe multiple times, the risk of complete data loss in the case of adverse wind patterns or balloon failure will begin to outweigh the benefits of continued data acquisition. This could be mitigated if the complete data could be transferred from the balloon periodically throughout the mission. For missions with high data rates (such as a wide field telescope), downloading the data via ground stations used for balloons may be prohibitively slow and unable to match the data rate. Other methods, such as using the Tracking and Data Relay Satellite System (TDRSS) or line of sight communications with multiple ground stations have in the past proven to be prohibitively expensive. We are developing AIRS (Automated Information Retrieval System), a lightweight glider capable of descending from 30km balloon altitude, autonomously compensating for the jet stream to land in a predetermined GPS coordinate. AIRS carries a solid-state drive capable of withstanding much more than the mild G forces encountered on landing. A prototype has been built and tested at low flight altitudes successfully. Production costs of AIRS are anticipated to be about \$1000 for parts and labor. In a one-day workshop we will explore various methods of retrieving balloon data in flight. We will compare the costs and risks of TDRSS, multiple line of sight ground stations, and AIRS. Collaborative efforts, and funding possibilities, to explore these concepts further will be discussed. The outcome will be an economical way to buy down a mission risk on ambitious future balloon missions. We will write a report on our findings and coordinate this with continued development of AIRS, which we plan to flight test (using a different funding source).

## Anticipated Benefits

Since there are no funded, ULDB missions, the benefit will largely be to future missions that may be proposed via the upcoming Explorer Mission of Opportunity of the ongoing ROSES-APRA program. We may be able to provide some benefit to ongoing long duration balloons by helping to buy down risk of payload loss or damage.



Project Image Retrieving Balloon Data in Flight

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## Organizational Responsibility

### Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

### Lead Center / Facility:

Jet Propulsion Laboratory (JPL)

### Responsible Program:

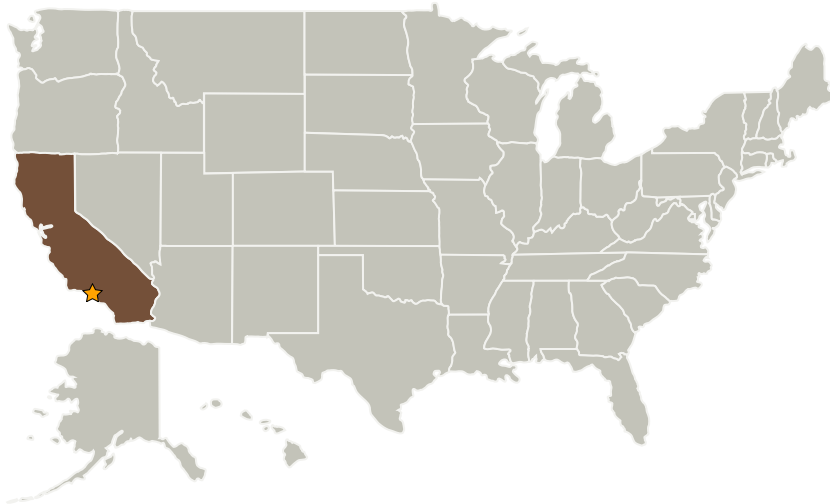
Center Innovation Fund: JPL CIF

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## Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
★ Jet Propulsion Laboratory(JPL)	Lead Organization	NASA Center	Pasadena, California

Co-Funding Partners	Type	Location
California Institute of Technology(CalTech)	Academia	Pasadena, California

Primary U.S. Work Locations
California

## Project Management

**Program Director:**

Michael R Lapointe

**Program Manager:**

Fred Y Hadaegh

**Project Manager:**

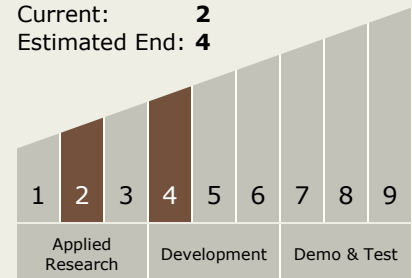
Jonas Zmuidzinas

**Principal Investigator:**

Jason D Rhodes

## Technology Maturity (TRL)

Start: 2  
 Current: 2  
 Estimated End: 4



## Technology Areas

**Primary:**

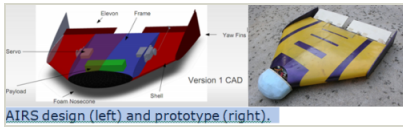
- TX06 Human Health, Life Support, and Habitation Systems
  - └ TX06.3 Human Health and Performance
    - └ TX06.3.3 Behavioral Health and Performance

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## Images



**89.png**

Project Image Retrieving Balloon  
Data in Flight  
(<https://techport.nasa.gov/image/1175>)